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ABSTRACT

The relationship between personality characteristics and academic success of college freshmen at a predominantly female campus was studied, using the Myers-Briggs Type Indicator (MBTI) to measure personality and first-year grade point average to measure academic success. The comparative effectiveness of the MBTI and the traditional predictors using Scholastic Aptitude Test (SAT) scores and high school rank was also assessed. The MBTI classifies people on each of four indices: extraversion/introversion, sensing/intuition, thinking/feeling, and judgment/perception. A sample of 1,812 freshmen entering the University of North Carolina, Greensboro, during 1977-79 were studied. Using dichotomous scores, a significant relationship was found between the first-year grade point averages and the students' preference for the sensing/intuition dimension: those with a preference for intuition tended to obtain higher GPAs. Using continuous scores, significant but low correlations (.08) were found between the sensing/intuition dimension and the GPA as well as the judging/perceptive dimension and the GPA. Based on the findings, it is suggested that the utility of the MBTI in predicting academic success is limited (the MBTI accounted for two percent of the variance in GPA). There were also inconsistencies in the results for male and black students and for students with certain majors. However, the fact that the introversion/extraversion dimension accounted for an additional seven percent of the variance in the GPA for 1979 black students, after the SAT and high school rank scores were included, suggests that the MBTI has the potential for being an important predictor of academic success for select groups. A bibliography is appended. (SW)

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PREDICTION OF ACADEMIC SUCCESS WITH THE MYERS-BRIGGS TYPE INDICATOR (MBTI)

A Paper Presented as Part of a Contributed Papers/Symposium on Uses of a Personality Indicator in Institutional Research

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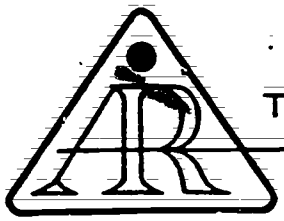

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

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Mary Corcoran
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PREDICTION OF ACADEMIC SUCCESS WITH THE MYERS-BRIGGS TYPE INDICATOR

With a projected national decline in the number of high school graduates in the period 1979-1985 of 17% (WICHE, 1979), a number of colleges and universities are certain to experience some difficulty in attracting and maintaining students with high academic aptitude. Although oversimplified, these colleges may face a situation of needing to lower the academic standards of the university to attract more students, or needing to abandon academic programs (including the dismissal of faculty and staff) which attract a limited number of students. An alternative to the above which may lessen the probability of the scenario becoming a reality is to use additional information in order to identify marginal applicants with heightened prospects for academic success. Such information includes not only the traditional aptitude measures of SAT scores and high school rank, but non-cognitive information as well. Personality measures are just one type of non-cognitive information which could be used as supplemental predictors of academic success.

In the above regard, Furniss (1979: p. 139) Director of the Office of Academic Affairs of the prestigious American Council on Education stated:

> "Active recruiting does locate qualified candidates otherwise overlooked. Some forms of testing for admissions are likely to be inadvertently biased (required interviews, for example, when the interviewer is untrained). Noncognitive factors, such as motivation, may assure success in a program despite weakness on cognitive tests. Differing standards may be good whereas lower standards may in the end make the student's efforts worthless. But the intervening years of experience combined with some (though not yet adequate) data now make it clear beyond reasonable doubt that achieving the nation's goals of participation for minorities in the full range of professional positions in society requires that the matter of enlarging the pools be given direct and unabashed attention."

Previous research involving the relationship between academic success and personality characteristics of college students has been rather inconsistent. In a review of studies employing Cattell's 16PF and Eysenck's Personality Inventory, Entwistle (1972) concluded that introversion was significantly

related to academic success, while stability (Neuroticism) was related to academic success only in certain subject areas. Similarly, Schuh (1978) found the Emotional Stability and Personal Relations scales of the Guilford-Zimmerman Temperament Survey and the Thurstone Interest Schedule to be significantly related to academic achievement in a personnel evaluation course. Ayers and Rohr (1972), on the other hand, found the G (Persistent), L (Adaptable), and Q_1 (Analytical) factors of Cattell's 16PF to be significantly correlated (r's of .11 and .14) to the overall GPA for third quarter sophomores; the stability factor was not significantly correlated with the GPA. The significant correlations observed in the Ayers and Rohr (1972) study are relatively low and may not be statistically "meaningful".

In studies involving the Edwards Personal Preference Schedule (Morgan, 1975, 1976), the California Personality Inventory (Watson, 1967; Evans, 1969) and the College Opinion Survey (Biggs, Roth, and Strong, 1970), personality characteristics were not found to be related to grade point average when controlling for various aptitude measures. These results contradict those obtained by Graff and Beggs (Note 1), Stroup (1970) and Stricker, Schiffman, and Ross (1965), who found personality measures added significantly to the prediction of grade point averages beyond such traditional aptitude measures as SAT scores and high school rank. Stroup (1970), in a 5-year study of entering freshmen using the California Personality Inventory found the multiple R's to increase from .512 to .573 for males and from .473 to .524 for females, when the scales of Socialization, Flexibility, and Femininity (for males) and Achievement vs. Conformity (for females) were added to SAT scores and high school rank.

In the Stricker et. al. (1965) study, the Myers-Briggs Type Indicator (MBTI) was administered in the late 1950's to over 200 male freshmen at Wesleyan University and at California Institute of Technology (CIT). Correlations between the four MBTI continuous scores and first-year GPA were less than .13

on all four scales for the CIT sample and for two scales for the Wesleyan sample. For the latter group, a correlation of -.24 was obtained between the Judging-Perceptive dimension and the GPA; moreover, a correlation of .18 was found between the Extroversion-Introversion dimension and the GPA. When the four MBTI scales were added to SAT scores and high school rank in predicting the GPA, the multiple correlation increased from .54 to .59 for the Wesleyan sample but remained constant (.39) for the CIT sample.

It thus appears that no definitive statement can be made as to the relationship between personality characteristics of college students and academic success. The relationship may be dependent upon both the sample in question and the personality assessment instrument.

Given the ambiguity in the above results, the present study sought to: (1) determine the relationship between personality characteristics, as measured by the Myers-Briggs Type Indicator, of freshmen at a predominantly female campus and academic success as measured by the first-year GPA; and (2) determine the effectiveness of the MBTI scales as supplemental predictors of the first-year GPA, when used in conjunction with the traditional predictors of SAT scores and high school rank.

Instrument

The Myers-Briggs Type Indicator (MBTI) is a self-reporting instrument based upon a conceptual scheme modified from Jung's Theory of Type. In essence, Jung's Theory assumes that much of the apparent random variation in human behavior is actually quite orderly and consistent, being due to certain basic differences in the way people prefer to use perception and judgment.

Perception is understood to include the processes of becoming aware of things, people, occurences, or ideas. Judgment is understood to include the processes of coming-to-conclusions about what has been perceived. If people differ systematically in what they perceive and the conclusions they

come to, they may as a result show corresponding differences in their reactions, in their interests, values, needs and motivations, in what they do best, and in what they like best to do.

Adopting this working hypothesis, the MBTI aims to ascertain people's basic preferences in regard to perception and judgment, so that the effects of the preferences and their combinations may be established by research and put to practical use. The MBTI contains separate indices for determining each of the four basic preferences which, under this theory, structure the individual's personality (Myers, 1962). The preferences are between Extraversion or Introversion, Sensing or Intuition, Thinking or Feeling, and Judgment or Perception. Four letters are used to represent the preferred poles of these four basic preferences. The poles are defined (McCulley, Note 2) as follows:

E, the extraverted attitude, in which energy and interest are directed mainly to the world of actions, objects, and persons,	or	I, the introverted attitude, in which energy and interest are directed mainly to the world of concepts and ideas.
S, sensing perception, concerned with observing what is real, immediate, and practical in experience,	or	N, intuitive perception, interested in seeing possibilities, meaning and relationships of events.
T, thinking, judgment, which is a rational process of reaching conclusions objectively, logically, and analytically,	or	F, feeling judgment, which is a rational process of weighing values to decide the importance of issues to oneself and others.
J, the judging attitude, in which the aim is to plan, organize, and control one's environment,	or	P, the perceptive attitude, in which the aim is to understand, experience and adapt to the environment.

Subjects

Each year entering freshmen and transfer students at the University of North Carolina at Greensboro (UNC-G) are asked to complete the MBTI either during summer orientation or upon their arrival to campus at the beginning of

the fall semester. UNC-G is a state university enrolling about 10,000 students with about 1400 students in each year's freshmen class. Approximately 75% of the freshmen class are females.

For this study the sample consisted of 1977-1979 entering freshmen for whom SAT scores, high school rank, first-year GPA, and MBTI profiles were available. The sample was composed of a total of 1812 freshmen who enrolled in UNC-G in 1977 (556), 1978 (531), and 1979 (725).

Procedure

Two types of measures can be obtained from the MBTI. The first employs dichotomous scores on each dimension. As indicated by Myers (1962, p.2): "What each (dimension) is intended to reflect is a habitual choice between opposites, analagous to right- or left-handedness. Thus, E-I means E or I rather than E to I."

To determine the relationship between academic success and MBTI profiles, analysis of variance procedures were utilized. Differences in the GPA's within each dimension (e.g., Extroversion vs. Introversion) as well as interaction effects were investigated. Dichotomous scores were used in classifying the students for these analyses of variance studies. Considering each of the dimensions as a dichotomy composed of opposite poles is more consistent with Jung's theory. However, one could also argue that by converting continuous scores to a dichotomy, valuable information is being lost; a continuous score would represent the degree of preference on each of the four MBTI dimensions. For this reason, continuous scores were employed in the second set of analyses.

The objective of this second group of analyses was to determine the effectiveness of the MBTI as supplemental predictors of first-year GPA. Stepwise multiple regression analyses were performed using continuous scores on each of the four dimensions. For both the ANOVA and regression studies, analyses were performed separately by race, sex, declared major, and total group for each year (1977, 1978, and 1979) of entry.

Results

Analysis of Variance Studies

Analysis of variance results for the 1977, 1978, and 1979 entering freshmen are presented in Tables 1, 2, and 3. As indicated in Table 1, there were no significant differences in the main effects or interactions for the 1977 entering freshmen class. This suggests that there was no relationship between MBTI type and academic success for this group of enrolled freshmen who entered the university in 1977.

For the 1978 and 1979 entering freshmen, significant differences were found between MBTI types and first-year GPA. In both groups, the S-N main effect was significant, revealing that students who had a preference for Intuition tended to obtain higher GPA's ($\bar{X}$=2.81 and 2.77, respectively, than students who had a preference for Sensing ($\bar{X}$=2.57 and 2.45 for the 1978 and 1979 students respectively). There was, however, a relatively low association between the S-N dimension and GPA for both 1978 and 1979 samples (ω^2=.02) indicating that the S-N dimension accounted for only 2% of the variance in the GPA.

As also revealed in Tables 2 and 3, two significant interaction effects were found for the 1978 and 1979 freshmen. For the 1978 class, the E-I x S-N and the E-I x J-P interaction was significant. Those who had a preference for Sensing and Introversion had a lower GPA mean ($\bar{X}$=2.43) than those who had a preference for Intuition and Introversion ($\bar{X}$=2.98). Extraversion appeared to have little effect on the GPA. Similarly, those who preferred Introversion and Judging tended to have higher GPA's than those who preferred Extraversion or Introversion and Perception.

For the 1979 entering freshmen a significant 2-way (S-N x J-P) and 3-way (S-N x J-P x T-F) interaction was identified. Students who preferred the Sensing and Perceptive dimensions tended to obtain lower GPA's than students who preferred Intuition or Judging. When the Thinking-Feeling dimension was

added, extreme differences were noted. A mean of 2.178 was found for those who preferred Sensing, Thinking, and Perception, while a mean of 3.03 was found for those who preferred Intuition, Thinking, and Perception.

An analysis of the GPA by MBTI type and race, sex, and declared major revealed similar results for the female and white populations across the years; however, a significant Judging-Perceptive main effect was identified for white students in 1978 and 1979. Students who had a preference for Judging tended to have higher GPA's ($\bar{X}$=2.89 and 2.83, respectively) than students who had a preference for Perception ($\bar{X}$=2.64 and 2.59, respectively).

In general, no significant main effects or interactions were found for males, blacks, and students majoring in Business, Education, Home Economics and Nursi

Regression Analyses

Intercorrelations between the MBTI continuous scores, SAT scores, high school rank, and first-year GPA for the combined 1977-79 classes appear in Table 4. As indicated, none of the correlations between the MBTI scores and GPA were greater than .09. The correlation between the S-N dimension and GPA was .08, suggesting a slight tendency for those with a greater preference for Intuition to obtain higher GPAs which is consistent with the analysis of variance results.

The results of the stepwise multiple regression analyses in predicting the first-year GPA using both the traditional aptitude measures and the MBTI continuous scores are presented in Table 5. The predictive validity of the SAT scores and high school rank for each year was fairly high (R^2s of .296, .339, and .338 respectively). Yet, when the MBTI scores were added into the equation, the Judging-Perceptive (J-P) dimension added significantly to the prediction of the GPA for the 1978 and 1979 entering freshmen. For these classes, however, the R^2 values increased to .347 and .352, indicating that

only an additional 1% of the variance in the GPA was accounted for by the J-P dimension. For the 1977 entering freshmen, the inclusion of the J-P dimension yielded an increase of .006 in the R^2 which was significant at the .08 level.

When the regression analyses for each class was analyzed by sex, race, and declared major of the students, the results for females and whites closely paralled that of the total class.

For the black entering freshmen, inconsistent results in the multiple Rs were found. For the 1977 class (N=46) only the SAT Math score was a significant predictor (R^2=.286) of academic success. In 1978 (N=65) high school rank, SAT Verbal and the Thinking-Feeling (T-F) dimension were significant predictors of the GPA. The T-F dimension increased the R^2 value from .345 to .399, explaining an additional 4.5% of the variance in the GPA. For the 1979 entering black freshmen (N=68) the significant predictors of the GPA were high school rank, SAT Math, and the Introversion-Extraversion (I-E) dimension of the MBTI. Here, the E-I dimension explained an additional 7.3% of the variance in the GPA. The R^2 value for high school rank and SAT Math was .273 while the addition of the E-I dimension increased it to .347.

When the predictive validity of the MBTI was analyzed by the declared major of the students, no significant increase in the multiple correlations were found when the MBTI dimensions were added to SAT scores and high school rank for students with a declared major in Education, Home Economics, and Nursing. For students with a declared Business major, the Thinking-Feeling (T-F) dimension was found to add significantly to the prediction of the GPA. The R^2 value using Rank and SAT scores as predictors was .297, and with the inclusion of the T-F dimension, the R^2 value was .348. Thus, an additional 5% of the variance in the GPA for Business majors was accounted for by the T-F dimension of the MBTI.

Discussion

The results of this study tend to support previous research which identified a low to moderate relationship between academic success and scores on the Myers-Briggs Type Indicator. Using dichotomous scores a significant relationship was found between the first-year GPA and the students' preference for the Sensing-Intuition dimension; those with a preference for Intuition tended to obtain higher GPAs. This result is consistent with that reported in the MBTI manual (Myers, 1962).

Using continuous scores, significant but low correlations (.08) were found between the Sensing-Intuition dimension and the GPA as well as the Judging-Perceptive dimension and the GPA. The correlations were very similar to those reported by Myers (1962), Nichols and Holland (1963), Stricker and Ross (1964), and Stricker, Schiffman and Ross (1965).

Although significant relationships were identified, a conclusion that the MBTI is moderately or strongly related to academic success seems unwarranted. For both the dichotomous and continuous scores the amount of variance in the GPA accounted for by any of the MBTI dimensions was less than two percent.

A similar result was also obtained when adding the continuous MBTI scores to the traditional aptitude measures in predicting the first-year GPA. In general, the Judging-Perceptive dimension, not the Sensing-Intuition (S-N) dimension, accounted for an additional one percent of the variance in the GPAs. The apparent discrepancy between the above results and those using the dichotomous scores can partially be explained by the fact that the S-N dimension was also moderately correlated with the SAT scores. Thus, much of the variance between the S-N scale and GPA was previously accounted for by the SAT score.

The results of this study raises an important question; that is, does a significant relationship between the MBTI and GPA suggest a meaningful improvement in the prediction of academic success? The ability of the MBTI to account for only two percent of the variance in the GPA suggests that it may not. Admissions officers therefore, must ascertain whether the time and effort involved in collecting information from the MBTI are worth the expense. The present study indicates that the utility of the MBTI is limited; however, other institutions may find this not to be the case. A case in point is the Medical Science Program at Florida State University-Florida A & M University. Here, the Sensing scale of the MBTI has been found to be an effective predictor of academic success. Prospective medical student applicants are given an additional 24 points to their Nonquantitative Admissions score if their MBTI scores indicate a Sensing preference (Fuller, McNamara & Green, 1978).

The inconsistencies in the results for male and black students, and for students with certain majors, warrants further investigations. The fact that the Introversion-Extraversion dimension accounted for an additional seven percent of the variance in the GPA for 1979 black students, after the SAT and high school rank scores were included, suggests that the MBTI has the potential for being an important predictor of academic success for select groups. This result is consistent with those obtained by Pfeifer and Sedlacek (1974) who found significant relationships between personality measures and college grade point averages for black students. The limited sample sizes of black and male students from the present study clearly limit any major generalizations in this regard. Future studies with larger sample sizes may, however, identify consistent results which suggest that the MBTI or other non-cognitive variables can add statistically and substantively significant results to the minority student recruitment equation.

The Supreme Court's decision in the Bakke case supports and encourages efforts to increase the number of minority professionals in American society. Yet as Furniss (1979) notes "The toughest question is 'What can be done to improve the high school graduate pool and by whom?" Further research on possible use of non-cognitive variables such as the MBTI in minority as well as majority admissions processes may be a partial answer to a most important question.

Table 1

ANOVA Summary Table of Differences in GPA by MBTI Types for 1977 Entering Freshmen

Source	DF	S 3	F	P
E-I (Extraversion-Introversion)	1	.123	.30	NS
S-N (Sensing-Intuition)	1	.866	2.15	NS
T-F (Thinking-Feeling)	1	.075	.19	NS
J-P (Judging-Perceptive)	1	.61	.15	NS
E-I X S-N	1	.188	.47	NS
E-I X T-F	1	.031	.08	NS
E-I X J-P	1	.207	.51	NS
S-N X T-F	1	.630	1.56	NS
S-N X J-P	1	.774	1.92	NS
T-F X J-P	1	.366	.91	NS
E-I X S-N X T-F	1	.176	.44	NS
E-I X T-F X J-P	1	.178	.34	NS
SN X T-F X J-P	1	.015	.04	NS
E-I X S-N X T-F X J-P	2	1.430	1.77	NS
Error	541	218.167		

NOTE: NS = Not significant

Table 2

ANOVA Summary Table of Differences in GPA by MBTI Type for 1978 Entering Freshmen

Source	DF	SS	F	P
E-I (Extraversion-Introversion)	1	.287	.69	NS
S-N (Sensing-Intuition)	1	5.012	12.08	.001
T-F (Thinking-Feeling)	1	.875	2.11	NS
J-P (Judging-Perceptive)	1	1.126	2.72	NS
E-I X S-N	1	4.636	11.18	.001
E-I X T-F	1	1.011	2.44	NS
E-I X J-P	1	1.762	4.25	.05
S-N X T-F	1	.085	.21	NS
S-N X J-P	1	.125	.30	NS
T-F X J-P	1	.560	1.35	NS
E-I X SN X TF	1	1.222	2.95	NS
E-I X T-F X J-P	1	.036	.09	NS
SN X T-F X J-P	1	.488	1.18	NS
E-I X SN X T-F X J-P	2	.334	.40	NS
Error	516	214.023		

NOTE: NS = Not significant

R^2: .090

Table 3

ANOVA Summary Table of Differences in GPA by MBTI Type for 1979 Entering Freshmen

Source	DF	SS	F	P
E-I (Extraversion-Introversion)	1	1.160	2.01	NS
S-N (Sensing-Intuition)	1	7.308	12.65	.001
T-F (Thinking-Feeling)	1	.170	.29	NS
J-P (Judging-Perceptive)	1	1.754	3.04	NS
E-I X S-N	1	1.071	1.85	NS
E-I X T-F	1	.956	1.65	NS
E-I X J-P	1	.587	1.02	NS
S-N X T-F	1	1.847	3.20	NS
S-N X J-P	1	3.203	5.54	.05
T-F X J-P	1	1.167	2.02	NS
E-I X S-N X T-P	1	.012	.02	NS
E-I X T-F X J-P	1	.324	.56	NS
S-N X T-F X J-P	1	5.315	9.20	.01
E-I X J-N X T-F X J-P	2	1.446	1.25	NS
Error	710	410.173		

R^2: .049

NOTE: NS=not significant

Table 4

Intercorrelations of MBTI, SAT, H.S. Math Scores, and GPA for Combined 1977, 1978, 1979 Entering Freshmen Class (N = 1367)*

	E-I	S-N	T-F	J-P	SAT-Verbal	SAT-Math	Rank	GPA
E-I (Extraversion-Introversion)	1.00							
S-N (Sensing-Intuition)	-.08	1.00						
T-F (Thinking-Feeling)	-.03	.05	1.00					
J-P (Judging-Perceptive)	.00	.26	.12	1.00				
SAT-Verbal	.06	.30	.03	.08	1.00			
SAT-Math	.05	.15	.00	.05	.47	1.00		
Rank	-.06	.05	-.04	.13	.10	.19	1.00	
GPA	.04	.08	-.02	-.08	.38	.41	.38	1.00

*Correlations greater than .05 were significant at the .05 level.

Table 5

Multiple R's of Stepwise Multiple Regression Analyses for 1977, 1978 and 1979 Entering Freshmen in Predicting the First-Year GPA

Variables Entered in Equation	1977	1978	1979
High School Rank	.439	.450	.423
SAT-Verbal	.498	.555	.553
SAT-Math	.544	.582	.581
Judging - Perceptive Dimension of the MBTI	.549*	.605	.593

*All variables entered into the regression equation were significant at the .05 level, except the J-P dimension for 1977 entering freshmen. For the 1977 students the inclusion of its J-P dimension was significant at the .08 level

REFERENCES

Ayers, J.B. & Rohr, J.D. Prediction of quality point averages from personality variables. Educational and Psychological Measurement, 1972, 32, 491-494.

Biggs, D. A., Roth, J.D. and Strong, S. R. Self-made academic predictions and academic performance. Measurement and Evaluation in Guidance, 1970, 3 (2), 81-85.

Entwistle, N. J. Personality and academic attainment. British Journal of Educational Psychology, 1972, 42, 137-51.

Evans, J. D. The relationships of three personality scales to grade point average and verbal ability in college freshmen. The Journal of Educational Research, November, 1969, 63 (3), 121-125.

Fuller, B., McNamara, P. P., and Green, K. C. Alternative admissions programs. In A. A. Astin, B. Fuller, and K. C. Green (eds.) New Directions for Higher Education: Admitting and Assisting Students after Bakke, 1978, 23.

Furniss, W. T. Professional education after Bakke. Educational Record, Spring, 1979, 60 (2), 137-145.

Western Interstate Commission for Higher Education (WICHE), High School Graduates: Projections for the Fifty States. Boulder, Colorado: Western Interstate Commission for Higher Education (WICHE), 1979.

Morgan, R.R. Prediction of college achievement using the need achievement scale from the Edwards Personal Preference Schedule. Educational and Psychological Measurement, 1975, 35, 387-392.

Morgan, R. R. Utilization of levels of intellectual ability as a control variable in studies of nonintellectual factors in academic achievement. Educational and Psychological Measurement, 1976, 36, 465-472.

Myers, I. B. The Myers-Briggs Type Indicator Manual. Princeton, N. J.: Educational Testing Service, 1962.

Nichols, R. C. and Holland, J. L. Prediction of the first year college performance of high aptitude students. Psychological Monographs, 1963, 77 (7) (whole no. 570).

Pfeifer, C.M. and Sedlacek, W.E. Predicting black student grades with nonintellectual measures. Journal of Negro Education, 1974, 43 (1), 67-76.

Schuh, A.J. Personality correlates of achievement in a personnel evaluation course. Educational and Psychological Measurement, 1978, 38, 1189-1191.

Stricker, L.J. and Ross, J. An assessment of some structural properties of the Jungian personality typology. Journal of Abnormal and Social Psychology, 1964, 68, 62-71.

Stricker, L. J., Schiffman, H., and Ross, J. Prediction of college performance with the Myers-Briggs Type Indicator. Educational and Psychological Measurement, 1965, 25 (4), 1081-1095.

Stroup, A. L. The prediction of academic performance from personality and aptitude variables. The Journal of Experimental Education, Spring, 1970, 38 (3), 83-86.

Watson, C. G. The California Psychological Inventory as a predictor of academic achievement in normal and maladjusted college males. Journal of Educational Research, 1967, 61, 10-14.